Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

aSD11
.21593
Reserve

MANAGEMENT OF VIRGINIA PINE

U.S.D.A.
NAT'L AGRIC LIBRARY
RECEIVED
JAN 27 '81

U.S. Department of Agriculture • Forest Service
Southeastern Area, State and Private Forestry

Forestry Report SA-FR 7
August 1980

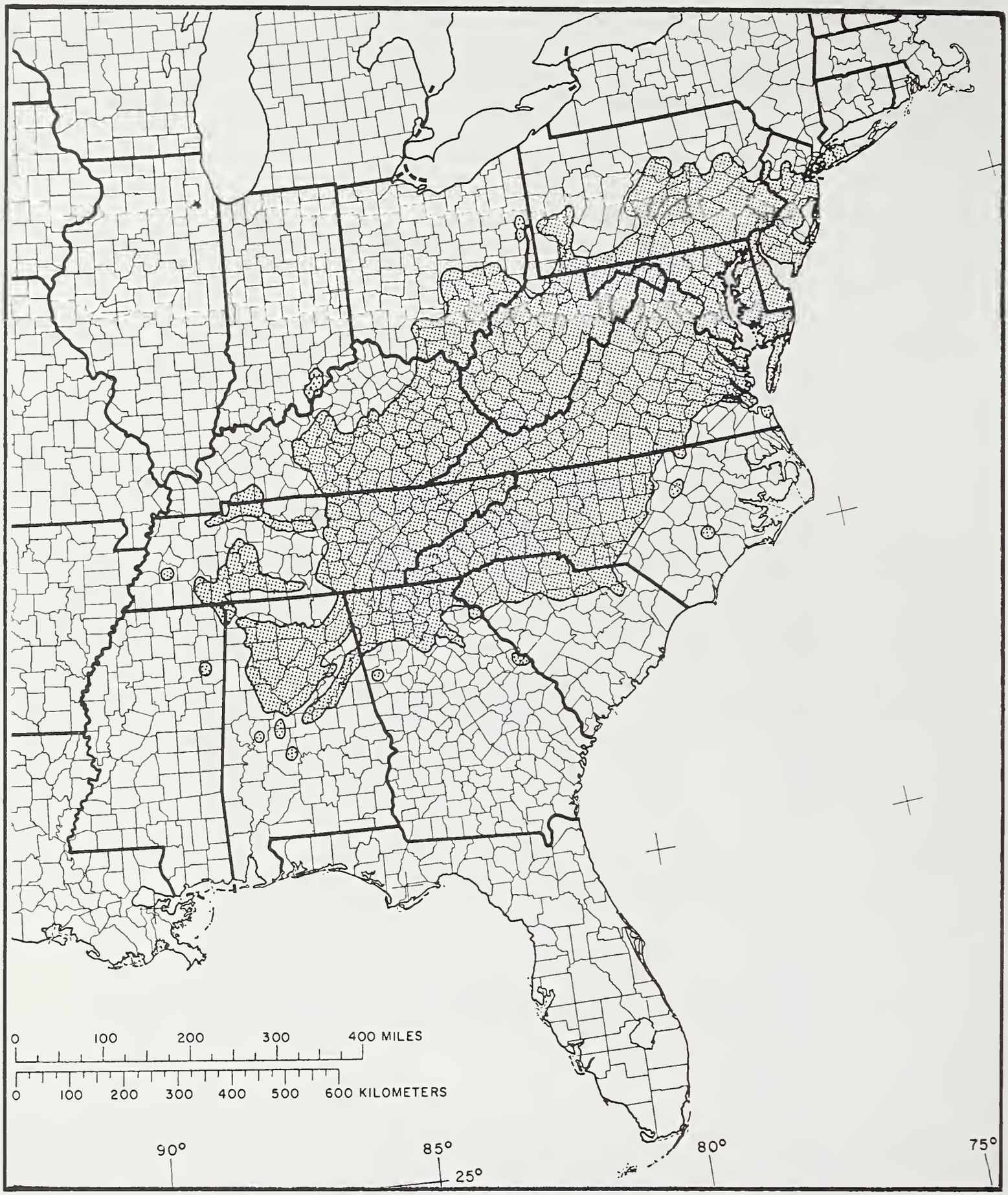

Figure 1. – The range of Virginia pine.

Cover Photo: A 31-year-old Virginia pine pole stand. Note the persistent branch stubs.

MANAGEMENT OF VIRGINIA PINE[1]

By Hamlin L. Williston and William E. Balmer[2]

Virginia pine grows in parts of 15 States (figure 1) at elevations from 100 to 2,500 feet (30.5 to 762 m). Annual precipitation in this area varies from 35 to about 55 inches (88.9 to 139.7 cm) per year. Virginia pine has endured temperatures of -25° and 110°F (-31.6° to 43.3°C).

SITE CHARACTERISTICS

Virginia pine grows best on north- and east-facing slopes, but is more often found on ridge tops and south- and west-facing slopes. It occurs on crystalline rocks, sandstone, shale and to a lesser extent, limestone. Normally found on shallow or exposed soils, it will not tolerate poor drainage. It grows well on clay, loam or sandy loam soils but poorly on shaly or very sandy soils. Those sites with sandy clay or silty clay are most favorable to Virginia pine.

REGENERATION

Most of the Virginia pine stands being managed and harvested today have resulted from natural seeding on abandoned agricultural lands. This species is a prolific seed producer. Seed crops occur at 1- to 4-year intervals. A bushel (35.2 L) of Virginia pine cones averages 2,244 cones, and a pound (.45 kg) of cleaned seeds averages 55,400 seeds, with a range of 45,000 to 91,000 seeds. Cones are borne as early as 5 years, but large volumes of seeds usually occur on dominant and co-dominant trees over 30 years of age.

Strip clearcutting is the preferred means of regeneration since Virginia pine is intolerant and so shallow rooted as to invite windthrow where seed trees are left. Expose the mineral soil to ensure a good catch. This is essential. Two acceptable site preparation methods are prescribed burning and scarification. The cleared strips can be 2 or 3 chains in width. In field trials, the leave strips have been treated with a light burn before cutting to stimulate advanced reproduction and to control small hardwoods. The fire killed 54 percent of the seed trees but enough advanced reproduction was established to satisfactorily stock the area after the final removal cut.

Plant Virginia pine either by hand or by machine. Prepare planting sites as for loblolly pine. The roots of 1-0 Virginia pine become fairly fibrous below the root collar. To avoid leaning seedlings, plant them at least 1 inch (2.5 cm) deeper than they grew in the nursery. Plant improved seedlings when available because they grow taller, prune better, and are straighter and more vigorous than forest run seedlings.

INTERMEDIATE CULTURE

Virginia pine, probably more than any other southern pine, often seeds in too heavily. The overly dense stocking results in slow growth – hence longer rotations, unusuable wood fiber deposited on many stems that never reach pulpwood size, needless loss of carbohydrates from excessive respiration, and possible stagnation.

Precommercial thinning at an early age is then desirable. Hand thinning to an 8.5 x 8.5 foot (2.6 x 2.6 m) spacing at age 6 has produced excellent results. Stands in the young sapling stage have been successfully treated by bulldozing parallel strips at regular intervals. Such strips are 6- to 8-feet (1.83- to 2.44 m) wide and spaced at 8-foot (2.44 m) intervals. The growth of trees along the edge of the "leave strips" has been stimulated and the rate of natural thinning within the strip increased. Other acceptable methods are drum chopping or bush hogging when 3 to 5 feet (.9 to 1.5 m) tall.

Virginia pine in most parts of its range is grown chiefly for pulpwood on 25- to 35-year rotations. Therefore, the practice of commercial thinning can be questioned. Virginia pine has been reported to show no marked increase in diameter growth as a result of release after thinning, unless cut before age 15. Thinning on shallow soils after age 15 exposes the stand to windthrow. There is also some indication that diameter growth responses do occur on the better loamy soils.

Where Virginia pine is being grown on sawtimber rotations, light thinnings should be made at approximately 10-year intervals. These thinnings should release the better dominants. Harvest trees that will soon die. If no more than 20 percent of the basal area is removed at one time losses to wind, snow and ice can be reduced.

[1]Based on papers by P. E. Barrett, P. J. Barry, Roger Belanger, George Brown, Jr., K. L. Carvell, R. W. Dimmick, John Kundt, W. H. Sites, and E. Thor presented at the Symposium on Management of Pines of the Interior South held at Knoxville, Tennessee on November 7-9, 1978; the authors' experience; and the literature cited on the last page.

[2]The authors are pine specialists, Southeastern Area, State and Private Forestry. Mr. Williston is stationed at the Area's field office at Jackson, Miss. Mr. Balmer is stationed at Atlanta, Ga.

GROWTH AND YIELD

Virginia pine is an intolerant species. Its growth habit is most responsive to stand density. Open-grown trees develop many persistent limbs – making it unattractive to pulpwood cutters. Its height growth is like that of shortleaf, pitch, or pond pines on most sites, but Virginia pines are usually 10 to 15 feet (3 to 4.6 m) shorter than loblolly at 50 years. Only on the poorest soils, where the site index for loblolly is less than 60 feet (18.3 m), does Virginia pine grow as rapidly in height as loblolly. Maximum annual height growth reported for Virginia pine has been 2.3 feet (.7 m) per year for 16-year-old plantations in Virginia.

In north Mississippi, loblolly, shortleaf, and Virginia pine were planted on a dry ridge top under a blackjack-post oak stand and immediately released. After 10 years, comparative data were:

Species	Survival	Height	D.b.h.
	Percent	*Feet*	*Inches*
Loblolly	56	23.5	4.6
Shortleaf	54	14.3	2.8
Virginia	53	12.9	3.3

In the Virginia Piedmont, 26-year-old stands in site classes of 50, 60, and 70 were thinned to residual densities, ranging from 40 to 180 square feet of basal area per acre (9.2 to 41.3 m^2/ha), at 5-year intervals. Following thinning, the total volume of the unthinned stands at age 26 ranged from 957 cubic feet per acre (67 m^3/ha) at site index 50, to 2,868 cubic feet per acre (200.7 m^3/ha) at site index 70 – a threefold difference in early production. Total volume growth over an 11-year study differed little among the three site classes, averaging about 142 cubic feet per acre (9.9 m^3/ha). Total yield per acre (thinned material plus standing volume at age 37) was 2,462 cubic feet (173.3 m^3/ha) on site 50, 3,359 cubic feet (235 m^3/ha) site 60, and 4,501 cubic feet (315 m^3/ha) on site 70.

Virginia pine, like other pine species, produced the greatest cubic foot volumes at the highest densities on the best sites – 5,958 cubic feet per acre (416.9 m^3/ha) at the 180 square foot (41 m^2/ha) class. Maintain basal areas at 100 square feet per acre (23 m^2/ha) or greater if your management objective is high yields of wood fiber. For production of small sawlogs by age 40, maintain basal areas at 60 to 80 square feet per acre (13.8 to 18.4 m^2/ha).

If grown to about 70-years of age, Virginia pine stands do produce a reasonably large cut of sawtimber, but the trees are small, usually 9 to 11 inches (23 to 28 cm) in d.b.h. Such stands yield 12,000 to 15,000 board feet per acre.

MANAGEMENT PROBLEMS

Fire.–Having relatively thin bark and lacking the ability to sprout from dormant buds, Virginia pines are far more susceptible to fire damage than are pitch and shortleaf pines. The needles are short and produce a scanty, relatively compact forest floor in pure stands. This often permits only a light fire with low flames, thus partly making up for the species' lack of resistance to fire damage. However, even old-growth trees die readily if heavy accumulations of fuel result in scorching burns. Prescribed burning in the winter can reduce heavy accumulations of fuel.

Insects.–Those insects most harmful to Virginia pine are the tip moths[3], all three southern pine bark beetles[4], the Virginia pine sawfly[5] and the pales weevil[6]. Damage is cyclical with build-ups from infestation centers which spread and reach a peak, followed by a decline. Damaged trees are most easily attacked.

Promptly salvage lightning-struck trees and those scarred by fires or logging. Severe attacks by the pales weevil, which girdles young seedlings, are most likely on recently cut-over or burned areas. Prevent this problem by delaying planting or seeding at least 9 months. Cut and prepare your site before July if you plan to plant during the following March or April. Maintain a healthy, vigorous stand to reduce losses to insects.

Diseases.–Red heart[7] begins to develop in Virginia pines when they're about 60 years old. The disease quickly becomes such a bad problem that sawlog rotations of no more than 70 years are suggested in the more northerly parts of the Virginia pine range. Annosus root rot[8] also can become a major problem. Control it by limiting the number of thinnings. Treat the freshly cut stumps with powdered borax. In areas south of 34 degrees north latitude, thin during the hottest months (May-August), when bark beetles are not a potential problem. Eastern gall rust[9] is common and can reduce tree form. This disease may weaken a tree, thereby giving other diseases and insects a better chance to injure or kill the tree. There is little control for Eastern gall rust under forest conditions.

Animals.–Rodents destroyed nearly 4,000 acres of 3- to 5-year-old Virginia pine on the Cumberland Plateau during the 1960's. The principal species causing the damage was the prairie vole[10] with pine voles[11] implicated in some instances. Elsewhere in the mid-South, cotton rats[12] and meadow voles[13] have caused damage, and in some cases they have attacked other species of pines. Cotton rats are more common in southern and western portions of the South, while meadow voles occur along the Blue Ridge and farther north and east.

Voles are strongly attracted to Virginia pine and, multiplying rapidly, are a problem until stand closure shades out the grass. Meadow voles mostly girdle the stem just above ground, with some feeding on the roots. Pine voles feed mainly on the roots. Zinc phosphide on grain applied at a rate of 10 pounds of grain per acre (1.1 kg bait/ha) will control the voles.

---

[3] *Rhyactionia frustrana* Comstock and *R. rigidana* (Fern).

[4] *Dendroctonus frontalis* Zimm., *D. terebrans* Oliv., and *Ips* supp.

[5] *Neodiprion pratti pratti* Dyar

[6] *Hylobius pales* (Herbst).

[7] *Fomes pini* (Thore) Lloyd.

[8] *Cronartium cerebrum* Hedgc. and Long.

[9] *F. annosus* (Fr.) Cke.

[10] *Microtus ochrogaster*,

[11] *M. pinetorum*

[12] *Sigmodon hispidus*

[13] *M. pennsylvanicus*

Weather.–Wet, clinging, heavy snow and glaze are especially damaging to sapling stands of Virginia pine, flattening patches of trees, especially where the stand has been opened up. Snow and ice damage is worst at the best age for thinning and is not as bad in older stands. Seed trees and trees along the edge of clearcut areas are often blown over because of their shallow root system.

This dense, 24-year-old stand of Virginia pine is of natural origin.

TREE IMPROVEMENT

There are approximately 200 acres (81 ha) of Virginia pine seed orchards in the South. They are located in Alabama, Georgia, North Carolina, South Carolina, Tennessee and Virginia. Because of some loss of interest in growing this species for pulpwood, some seed orchards are inactive.

Kimberly-Clark Corporation at Coosa Pines, Alabama has established the most noteworthy seed orchard from selected parents in west Jefferson County, Alabama. From the 27 clones originally grafted, eight were selected, based on Christmas tree characteristics. The others were rogued from the orchard. The selected trees tend to be straighter, taller and have a grey bark. On a relatively poor site, 30-year-old trees ranged from 60 to 80 feet (18.3 to 24.4 m) in total height. Most of these Jefferson County trees complete their female flowering cycle before the pollen production of other sources. The company now produces 3 million Virginia pine Christmas tree seedlings, yearly.

Seed from 12 stands in Kentucky and Tennessee were collected and the 1-year-old progenies outplanted in Tennessee. After 10 growing seasons, two east Tennessee sources (Etowah and Vonore) ranked high in the plantations on the Cumberland Plateau, Highland Rim, and in west Tennessee, when remeasured. Generally, trees from the poorest sources grew about 70 percent as much in volume as those from the best source.

In a Tennessee Valley Authority progeny test, poor drainage reduced height growth and increased the susceptibility of Virginia pine to pitch canker[14]. Performance of progenies from 22 controlled crosses indicated that height growth is inherited in an additive manner, while resistance to pitch canker appears to be by dominance or epistatic gene action.

THE OUTLOOK

Limit Virginia pine planting to dry sites in the Upper Coastal Plain, Upper Piedmont, Blue Ridge, Valley and Ridge, Appalachian and Interior Low Plateaus. It grows better than shortleaf on adverse sites in these regions. It is, however, primarily a pulpwood species that can be most economically managed using natural regeneration.

Where regenerated naturally or intentionally as by strip clearcutting, Virginia pine often seeds in too heavily. Precommercial thinning by hand is too expensive. Thin by mechanical means or not at all.

Grow this species mostly on a 25- or 30-year rotation for pulpwood. On the better sites, thin it at 10-year intervals to encourage the production of small sawlogs. With this objective, do not exceed a rotation of 60 years since it is highly susceptible to red heart past this age. Because Virginia pine is subject to windthrow, begin thinning at an early age – and thin lightly.

[14] *Fusarium moniliforme var. subglutinans* Wr. and Reink.

The 17-year-old tree in the foreground shows typical branching habits of open-grown Virginia pine.

Because Virginia pine is one of the more acid-tolerant species and can survive on soils with a pH as low as 4.0, it is well adapted for surface mine reclamation. On many of these sites, its growth has equaled or exceeded that of other pines.

Virginia pine appears to be the best Christmas tree species in the warmer areas of the South. The returns on properly managed pines can be great. Here lies the future of Virginia pine.

SUGGESTED READING

Fenton, R. H. and A. R. Bond.
1964. The silvics and silviculture of Virginia pine in Maryland. U.S. Dep. Agric. For. Serv., Northeast. For. Exp. Stn., Broomall, Pa. Res. Pap. NE-27, 36 p.

Fenton, R. H.
1965. Precommercial thinning not recommended for Virginia pine stands in southern Maryland. U.S. Dep. Agric. For. Serv., Northeast. For. Exp. Stn., Broomall, Pa. Res. Note NE-40, 7 p.

Slocum, G. K., and W. D. Miller.
1953. Virginia pine. N.C. State Univ., Agr. Exp. Stan., Raleigh, N.C. Tech. Bull. 100, 52 p.

Snow, A. G., Jr.
1960. Silvical characteristics of Virginia pine. U.S. Dep. Agric. For. Serv., Northeast. For. Exp. Stn., Broomall, Pa. Pap. 131, 22 p.

Williston, H. L.
1962. Conifers for conversion planting in north Mississippi. Tree Planters' Notes 54:5-7.

PESTICIDE PRECAUTIONARY STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key – out of the reach of children and animals – and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first-aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the Federal Environmental Protection Agency, consult your State forestry agency, county agricultural agent or State extension specialist to be sure the intended use is still registered.

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others which may be suitable.

USDA Forest Service
Southeastern Area
1720 Peachtree Road, N.W.
Atlanta, Georgia 30367